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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/612,009	07/03/2003	Ricko Fukushima	7906.0018	5452

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EXAMINER

HAJNIK, DANIEL F

ART UNIT	PAPER NUMBER
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2628

MAIL DATE	DELIVERY MODE
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11/15/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/612,009

Applicant(s)

FUKUSHIMA ET AL.

Examiner

Daniel F. Hajnik

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 September 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/14/2007 has been entered.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 5, and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Olympus (Japanese Publication Number 06-070267, pub Mar 11, 1994) in view of Petrich (US Pub 2006/0280368 A1).

As per claim 1, Olympus teaches the claimed:

1. A three-dimensional image display method (*in figure 2 and in the English translation of the abstract, where it states that the device produces image data to be displayed*) comprising:
detecting directions of incident light emitted from a light source at a plurality of detectors; (*in figure 3, the photodetectors 11, and [0008] of the English Translation, where two or more*

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photodetectors analyze and determine the direction of the lighting of the external world by a processing circuit);

displaying the three-dimensional image with the shadow *(in figure 2 and in the English translation of paragraph [0006]).*

Olympus does not explicitly teach the remaining claim limitations.

Olympus suggests the claimed:

comparing the position of the light source and a virtual position of a display object in a three dimensional image displayed in real space to obtain a shadow for applying to the display object from a direction of the light source, the shadow being caused by the light source; *([0006] and [0008] of the English Translation which teaches of generating the image in figure 2b according to the detected light directions and shading their respective synthetic image according to the detected lighting directions so that the synthetic image generated is in agreement with the detected light directions);*

In this instance the direction of a light source and a virtual position of a display object are compared in Olympus. It would have been obvious to modify Olympus to include the claimed comparing the position of a light source with the display object in order to get a more accurate understanding of the shadow creation process when comparing the position of light source and the virtual position of a display object in real space.

Petrich teaches the claimed:

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calculating a position of the light source existing in real space based on the detected directions ([0034], “FIGS. 8, 9, 10, and 11 illustrate examples of how light qualities such as relative direction in relation to camera position, degree of diffusion, and degree of ambiance are ascertained from a digital image” and [0036], “Mathematical algorithms may also be used in place of a know table of values to calculate the position of light”).

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Olympus with Petrich in order to obtain more accurate information relating to the light source such as a the position in addition to the direction.

As per claim 2, Olympus teaches the claimed:

2. The method according to claim 1, further comprising:

detecting lightness of the light source at the detectors ([0008] of the English Translation where the lightness is detected at photodetectors 11).

As per claim 3, the reasons and rationale for the rejection of claim 1 is incorporated herein.

Olympus teaches the claimed:

detecting directions of incident light emitted from a plurality of light sources at a plurality of detectors ([0008] of the English Translation where it states the photodetectors can be used to detect the direction of indoor lighting, thus the system in a room indoors with two lights would detect the indoor lighting direction of a plurality of light sources).

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As per claim 5, this claim is similar in scope to claim 1, and thus is rejected under the same rationale.

As per claim 7, Olympus teaches the claimed:

7. The device according to claim 5, further comprising: a display surface configured to display the three-dimensional image, wherein: the direction detectors are disposed on at least one of the display surface and a surface adjacent to the display surface. *(in figure 1 where the detectors 11 are both on a display surface and adjacent to the display surface where these detectors are part of the head mount display where the display surface is the portion that covers the eyes of a user when wearing the device).*

As per claim 8, Olympus teaches the claimed:

8. The device according to claim 5, further comprising: a display surface configured to display the three-dimensional image, wherein: the direction detectors are disposed to be adjacent to the display surface *(in figure 1 where the detectors 11 are adjacent to the display surface which is the part of the head mounted display where the display surface is the portion that covers the eyes of a user when wearing the device).*

As per claim 9, Olympus teaches the claimed:

9. The device according to claim 5, wherein the direction detectors are disposed at a position where the direction detectors detect the light emitted from the light source located in the same direction as at least one of a display direction of the three dimensional image and a direction in

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which the three-dimensional image is observed (*in figure 1 where it shows detectors 11 can be disposed at a direction the same as a display direction of the head-mounted display in relation to the user*).

As per claim 10, Olympus does not explicitly teach the claimed limitations.

Petrich teaches the claimed:

10. The device according to claim 5, wherein: each of the direction detectors include three-primary colors detection unit that adds colors to the shade. ([0030], "other methods of detecting said target devices within a digital image include the use of: HSL, HSV, LAB, RGB and other digital image color spaces" where RGB is a red, green, and blue color sequence).

It would have been obvious to one of ordinary skill in the art to use the claimed feature with Olympus in order to more accurate capture color data for analysis which can be used to produce better synthetic images.

3. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Olympus (Japanese Publication Number 06-070267, pub Mar 11, 1994) in view of Petrarch (US Pub 2006/0280368 A1) in view of Drettakis et al. (NPL Document "Interactive Common Illumination for Computer Augmented Reality", herein referred to as "Drettakis").

As per claim 4, Olympus does not explicitly teach the claimed limitations.

Drettakis teaches the claimed:

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obtaining a position of a single virtual light source, which represents the plurality of light sources; *(at the top of the page where section 6.3 starts, "In addition, special attention must be taken in the re-scaling of the image before display since the addition of a source can add an order (or orders) of magnitude to the radiosity values of the scene". Here, the single virtual light source can be represented as the accumulation of radiosity. The reference refers to "adding" light onto the total radiosity for each light source. When every light source is considered, one can represent this radiosity as a single virtual light source through the addition of all individual light sources)*

comparing the position of the virtual light source and the virtual position of the display object in the three-dimensional image to obtain a virtual shadow for applying to the display object from a direction of the single virtual light source, the virtual shadow being caused by the single virtual light source *(in figures 3 and 4. Figure 4 shows the result of the comparison between the virtual light source (as calculated as the accumulated radiosity in figure 3) and the virtual position of the display object (the floating box above the desk). The comparison of the positions and relative positional relationship result in the rendering of a soft and varying shadow on the desk below the floating object. The varying nature of this shadow can be due to the plurality of light directional components provide by the virtual light source).*

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Olympus, Petrich, and Drettakis. Drettakis teaches one advantage of the combination (in the abstract, "Our new framework will hopefully lead to CAR systems with interactive common

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illumination without restrictions on the movement of real or synthetic objects, lights and cameras” where the combining of light sources in Drettakis helps accomplish this stated goal by making it easier to do interactive illumination without restrictions).

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel F. Hajnik whose telephone number is (571) 272-7642. The examiner can normally be reached on Mon-Fri (8:30A-5:00P).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka J. Chauhan can be reached on (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

D. N.

DFH

Ulka Chauhan

ULKA CHAUHAN
SUPERVISORY PATENT EXAMINER